Journal of Pioneering Medical Sciences
Received: June 05, 2025 | Accepted: July 08, 2025 | Published: September 05, 2025
Volume 14, Issue 08, Pages 33-39

DOI https://doi.org/10.47310/jpms2025140806

Needlestick and Sharp Injuries Among Nurses in Kirkuk City Hospitals: Prevalence and Contributing Factors

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Abstract: **Background:** Needlestick and sharp injuries are percutaneous injuries caused by needles or sharp objects contaminated with blood or bodily fluids. They represent a significant occupational hazard to hospital staff. The aim of the study was to investigate the prevalence and contributing factors of Needlestick and Sharp Injuries in nurses from four hospitals in Kirkuk City. **Method:** A descriptive cross-sectional study was conducted among 200 nurses, purposively selected from the emergency department of four hospitals in Kirkuk City, between November 10, 2024, and May 10, 2025. A structured questionnaire and observational checklist served as data collection instruments. The Statistical Package for the Social Sciences (SPSS), version 26, was used for data entry and analysis. Both descriptive and inferential statistical methods were employed to analyze data. **Result:** Among the 200 enrolled nurses, 158 (79%) reported exposure to Needlestick and Sharp Injuries. Of those injured, 90 nurses (45%) reported their injuries. More than half of the injuries (67.1%) occurred during the morning shift. Syringe needles were the most common devices causing sharp injuries (70.9), and injections were identified as the primary procedures leading to these incidents (73%). Most injuries occurred during recapping (63.3%). No significant associations were found between injuries and age, gender, employment duration, or education; however, marital status showed a significant association. **Conclusion:** The study revealed a high prevalence of Needlestick and Sharp Injuries among nurses at Kirkuk hospitals. It emphasizes the need for targeted training on sharp object handling, strict adherence to safety protocols, improved reporting of incidents, and the elimination of risky practices like needle recapping to reduce injury rates and enhance occupational safety.

Key Words: Occupational Exposure, Needlestick, Sharp Injuries, Nurses

INTRODUCTION

A needlestick and sharp injury are occupational injuries caused by unintentional puncture or laceration of the skin by needles or sharp medical instruments. These injuries are commonly sustained by healthcare workers (HCWs) during the performance of medical procedures [1]. NSSIs include injuries caused by hypodermic needles, blood collection needles, intravenous (IV) cannulas, and various sharp instruments such as scalpels, blades, lancets, retractors, scissors, pins, grips, cutters, staples, and glass objects [2]. The World Health Organization (WHO) has established comprehensive guidelines aimed at reducing NSSIs in healthcare settings; however, these injuries continue to occur at various stages of handling and disposing of sharp instruments. According to [3], approximately 35 million healthcare workers worldwide experience occupational NSSIs annually. In the United States, an estimated 385,000 NSSIs occur each year among HCWs, while Europe reports about 1,000,000 cases annually among hospital HCWs [4]. The prevalence of NSSIs is particularly high In Iraq, with studies indicating prevalence rates as high as 85% among HCWs [5]. Contamination of equipment and needles facilitates the transmission of the virus, even after months[6]. NSSIs present a risk for the transmission of over 20 different bloodborne infections. The WHO indicates that NSSIs account for a significant proportion of global infections, with hepatitis B virus (HBV) responsible for 36.7%, hepatitis C virus (HCV) for 39%, and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) for 4.4% of infections linked to this mode of transmission [7]. Multiple factors contribute to the occurrence of sharps injuries, including the type and design of needles, activities such as recapping, specimen handling and transfer, collisions between staff and sharps, cleanup tasks, manipulation of needles during patient care, passing and handling devices, and improper disposal of needles in

puncture-resistant containers [8]. Additionally, research indicates that increased workload, personnel shortages, various invasive interventions, severe patient conditions, stress, and performance of multiple invasive procedures significantly elevate the risk of injuries among nurses working in acute healthcare settings, such as operating rooms, emergency departments, and intensive care units [9]. Compliance with standard precautions is one of the most effective strategies for preventing infections resulting from occupational exposures. These precautions include hand hygiene, the use of personal protective equipment (such as gloves, goggles, and masks), environmental control, proper waste management, and measures to prevent injuries from sharp instruments. Compliance with precautions is essential as the primary method for infection prevention in healthcare settings. Therefore, all hospital staff must possess adequate knowledge and skills to apply these precautions universally [10]. Additionally, effective management strategies are critical for preventing and addressing NSSIs and their associates. Such strategies include the administration of the HBV vaccine, provision of appropriate postexposure prophylaxis (PEP), ongoing training programs, and ensuring the availability of designated sharps disposal containers in every hospital room to eliminate unsafe practices such as needle recapping [2]. The NSSIs represent a significantly underestimated occupational hazard for nurses, particularly in Kirkuk City. Although some studies have been conducted across Iraq, there remains a notable lack of research specifically addressing the prevalence and contributing factors of NSSIs within Kirkuk hospitals. This knowledge gap impedes the formulation of effective prevention strategies. Accordingly, the present study was designed to determine the prevalence of NSSIs among nurses in Kirkuk hospitals. This constitutes an important step toward clarifying the scope of the problem and provides a scientific basis for policymakers to develop targeted strategic plans aimed at reducing the incidence of NSSIs and their associated complications.

MATERIALS AND METHOD

The study Designing and Setting

A descriptive cross-sectional study was conducted in Kirkuk City from November 10, 2024, to May 10, 2025. Kirkuk is located 148 miles (238 kilometers) north of Baghdad. Has 1,483,788 residents [11]. The study took place in the emergency departments of four hospitals: Azadi Teaching, Kirkuk Teaching, Maternity and Child, and Pediatric.

Sample and Sampling Procedure

Out of a total of 300 nurses working in the emergency departments of four hospitals, 200 nurses consented to participate in the study. Participants were selected based on their willingness to take part. Nurses who were unable to provide information due to illness or leave, those working in electrocardiogram (ECG) and casting rooms, and administrative nurses not exposed to NSSIs were excluded. The study utilized purposive sampling, a non-probability method, to select participants who met inclusion criteria [12].

Instruments and Procedures

Data collection was conducted from December 22, 2024, to February 22, 2025, using a structured questionnaire divided into three parts. The first part gathered sociodemographic information including age, gender, years of employment, level of education, and marital status. The second part focused on the nurses' professional background, covering participation in supportive activities such as training sessions, educational programs, and symposia related to infection control. The third part addressed the participants' history of NSSIs, including details such as exposure to sharp objects previously used on patients, frequency of injuries, injury reporting practices, location of care after injury, reasons for not reporting, timing of injuries, types of needles or sharp objects involved, procedure during which injuries occurred, duration severity of the injury, affected body sites, main contributing factors, post-injury actions, contamination status of the sharp objects, hepatitis vaccination status, and completion of the vaccination schedule.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee of the College of Nursing at the University of Kirkuk. Additionally, formal authorization to conduct the research was granted by the Kirkuk Health Directorate. Prior to data collection, all participants provided verbal informed consent after being fully informed about the study's purpose, procedures, and their rights.

Data Analysis

The study data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the characteristics of the study variables. To examine the association between sociodemographic factors and the occurrence of NSSIs, inferential statistical methods were applied. Non-parametric tests, specifically the Chi-square test and Fisher's exact tests, were employed to assess the statistical significance of the associations between categorical variables. The normality of the study variables was evaluated using the Kolmogorov-Smirnov test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The study involved 200 nurses, yielding a 100% response rate. Among the participants, 104 (52%) were female and 96 (48%) were male. The mean age was 25.89 ± 4.840 years, ranging from 20 to 45 years. More than three-quarters of the nurses, 158 (79%), reported injuries from sharp objects, while 42 (21%) had not experienced such injuries (Figure 1). Of those injured, 74(46.8%) had experienced multiple injuries. Injury reporting was noted in 90 nurses (57%), with approximately 36 (52.9%) citing lack of time as the primary reason for not reporting. The majority of injuries, 52 (67.1%)

Table 1: The Distribution of Background History for the Study Sample (N = 158) Concerning Needlestick or Sharp Injuries

Variables	No.	%
Frequency of sharps injuries		
Once	74	46.8
Two to four times	50	31.6
≥ five times	12	7.6
Don't remember	22	31.9
Reporting of sharp injuries		
Yes	90	57.0
No	68	43.0
The reasons for not reporting		
Did not have time to report	36	52.9
Did not know reporting procedure	6	8.8
Did not think it was important to report	20	29.4
Thought exposure was low risk for infection	6	8.8
Time of injury		
Morning shift	106	67.1
Night shift	52	32.9
Type of needle or sharp object		
Syringe needle	112	70.9
Cannula	32	20.3
Suturing needle	28	17.7
Scalpels and scissors	10	6.3
Ampoule	30	19.0
Procedure for which sharp object was used		
Injection through skin or mucous membrane	116	73.0
Opening ampule	26	16.5
To connect IV line	34	21.5
Suturing	38	24.1
Situations and circumstance during which injury occurred		
While inserting needle	44	27.8
While manipulating needle	36	22.8
While withdrawing needle/sharp	38	24.1
Suturing	12	7.6
Recapping	100	63.3
Severity of injury		
Superficial	106	67.1
Moderate	44	27.8
Severe	8	5.1
Body site of injury		
Finger	118	74.6
Palm	18	11.4
Arm	14	8.9
Face	8	5.1
Main factors contributing to injury		
Workload	60	38.0
Inappropriate training	12	7.6
Handling uncooperative patient	32	20.2
Tired and lack of sleep	36	22.8
Busy and not attention	18	11.4
Procedures after an injury		
Washed with soap and water	74	46.8
Cleaning by Cotton	44	27.8
Squeezing injury	64	40.5
Get tested for HIV, hepatitis B, and hepatitis C	28	17.7
Did not think	10	6.3
Hepatitis vaccine		
Yes	134	67.0
No	66	33.0
Completed the vaccination schedule		
Yes	108	80.6
No	26	19.4

occurred during the morning shift. Syringe needles were the most common instruments involved, accounting for 112 injuries (70.9%). More than half of the injured nurses, 100

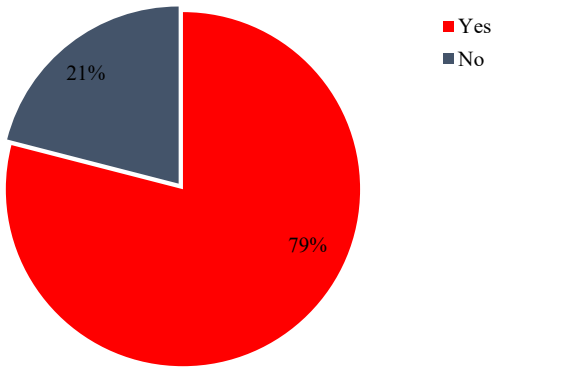

Figure 1: Distribution of Needlestick or Sharp Injury of the Study Sample (N = 200)

63.3%), sustained injuries while recapping needles. Injury severity was predominantly superficial (67.1%), with 44 (27.8%) classified as moderate. Fingers were the most affected body part, with 118 injuries (74.8%). Workload was identified as the main contributing factor in 60 cases (38%). The most common immediate action taken after injury was washing the site with soap and water. Regarding hepatitis vaccination status, 134 nurses (67%) had received the vaccine. Among those vaccinated, 108 (54%) completed the vaccination schedule (Table 1). The analysis of sociodemographic factors in relation to NSSIs among nurses revealed that marital status was significantly associated with injury occurrence ($p = 0.009$, effect size = 0.222), with divorced nurses reporting the highest injury rate (100%), followed by single nurses (81.7%), married nurses (68.9%), and widow nurses (50%). In contrast, no significant associations were found between injury rates and other variables such as age ($p = 0.497$, effect size = 0.107), gender ($p = 0.178$, effect size = 0.078), years of employment ($p = 0.570$, effect size = 0.107), level of education ($p = 0.918$, effect size = 0.030), or attendance at infection control training sessions ($p = 0.238$, effect size = 0.065) (Table 2).

DISCUSSION

This study revealed a high prevalence of NSSIs, affecting 79% of nurses working in emergency departments in Kirkuk. Syringe needles were identified as the most common cause of these injuries, with recapping being the primary activity during which injuries occurred. Notably, only about two-thirds of the nurses had received the hepatitis B vaccine, and a significant proportion reported their injuries, underscoring persistent gaps in occupational safety practices. The finding that over three-quarters of nurses sustained at least one needlestick and sharp injury aligns closely with research conducted in Iraq, where 74.3% of respondents reported a history of such injuries [13]. The relatively high prevalence may be attributed to factors such as increased workload, a rise in therapeutic interventional procedures, unsafe injection practices, improper disposal methods, and the lack of adequate safety boxes. However, the prevalence observed in this study was lower than figures reported in other regional studies: 85% in Al-Najaf City, Iraq [5]., 87.4% in Erbil City, Iraq [14]. and also in a neighboring country, 95.36% in Jeddah City, Saudia Arabia [2]. The results were higher

Table 2: Association Between Sociodemographic Characteristics of Nurses (N = 158) and Needlestick or Sharp Injuries Scores

Needlestick or Sharp Injuries					
Variables	N	Yes F (%)	No F (%)	p-value	Effect size
Age (Years)					
20-24	95	73(76.8)	22(23.2)	0.497**	0.126
25-29	74	59(79.7)	15(20.3)		
30-34	14	11(78.6)	3(21.4)		
35-39	10	10(100)	00		
40-45	7	5(71.4)	2(28.6)		
Gender					
Male	96	79(82.3)	17(17.7)	0.178*	0.078
Female	104	79(76)	25(24)		
Years of employment					
(1-5)	158	123(77.8)	16(18.6)	0.570**	0.107
(6-15)	30	16(76.2)	5(23.8)		
(16-25)	8	9(90)	1(10)		
(<25)	4	7(87.5)	1(12.5)		
Level of Education					
Graduate of nursing school	12	9(75)	3(25)	0.918*	0.030
Graduate of medical institute	132	104(78.8)	28(21.2)		
Graduate of the college of nursing	56	45(80.4)	11(19.6)		
Marital status					
Single	120	98(81.7)	22(18.3)	0.009**	0.222
Married	61	42(68.9)	19(31.1)		
Divorced	17	17(100)	00		
Widowed	2	1(50)	1(50)		
Training sessions regarding infection control					
Attended	151	117(77.5)	34(22.5)	0.238*	0.065
Not attended	49	41(83.7)	8(16.3)		

*Chi square, **Fisher's Exact

compared to those reported in studies from Iraq (66.7%) [15]., and Libya (66.6%) [16]. These differences could be due to self-reporting, sampling methods, instrumentation, and sample sizes. Less than half of the nurses experienced an injury only once. This finding was consistent with that of another Ethiopian study [17]. Similarly, [18] reported that more than one-quarter of nurses had experienced two to four prior NSSIs. The frequency of injuries among regions varies based on nurses' knowledge, use of personal protective equipment uses, and prior training. Regarding the reporting system, most nurses reported their injuries, which aligns with a study conducted in Kochi, India [3]. In contrast, previous studies found that a significant proportion of nurses did not report needlestick injuries[19]. Reporting injuries facilitates post-exposure prophylaxis, early identification of possible infections, and the provision of optimal treatment. The main reason for not reporting, as indicated by this study, was that most of the nurses did not have time to report their injuries. These findings are consistent with a study conducted in Saudi Arabia [20]. However, a cross-sectional study by [21] in Tikrit City, Iraq, found that the most common reason for not reporting was a lack of knowledge about where and to whom to report. Heavy workload, extended hours, and demanding shifts are potential factors contributing to the underreporting of NSSIs. The study also revealed that more than half of the nurses sustained injuries during the morning shift. This is in agreement with previous survey among Turkish HCWs, where needlestick injuries mostly occurred during the morning shift [22]. Conversely, [23] reported that the majority of injuries occurred during the night shift. The study's results indicate that syringe needles were the most common devices associated with NSSIs. These findings align with the previous studies in Iraq and China, which demonstrated that syringes were a common cause of NSSIs among HCWs [24,25]**.** This may be because syringe needles are used across all departments of healthcare facilities, unlike other sharp instruments, which are limited to certain departments. Conversely, one study found that intravenous (IV) cannulas were the most frequently involved in the majority of incidents [26]. The study found that injections were the procedures that most commonly associated with sharps injuries. Supporting this finding, [27]. Reported that most sharp injuries occurred during injections. However, a survey by [28]. identified suturing as posing the greatest risk of needlestick injuries among procedures, followed by IV injections. Consistent with [29]., recapping was the activity most frequently reported as resulting in NSSIs. Similarly, [30]. identified needle recapping as the most common source of such injuries. These incidents may be attributed to a lack of training and the absence of needle-crushing devices in healthcare settings. Regarding the injury severity, The study showed that most of the nurses have superficial injuries. This aligns with findings by [31]. In contrast, [32] found that the majority of injured hospital healthcare professionals sustained moderate injuries.The study aligns with research conducted in Amman, Jordan, which found that the body areas most affected were the fingers,

followed by the palm [33]. This may be due to the manner in which individuals handle needles or load and unload scalpels, primarly with their hands. The results of the current survey on main factors contributing to injuries reveal that more than one-quarter of nurses identified workload as a primary factor leading to sharp injuries. This finding coincides with the results reported by [34]. For post-injury care, washing the injured site with soap and water was the most common procedure, aligning with [17]. While [2] noted that some participants preferred cleaning the site with cotton and squeezing the wound. Furthermore, over half of the participants reported being immunized against HBV, consistent with [32], with most nurses completing the full three-dose vaccination schedule as also reported by [35]. The study reveals no association between age, gender, and years of employment and NSSIs. This finding coincides with the result of another study [21]. In contrast, some previous studies found that age and years of employment, could influence the risk of such injuries [14]. Furthermore, consistent with the other study, no association was found between levels of education and NSSIs [36]. This may be explained by the fact that the nurses in the study follow similar safety protocols and work under uniform hospital policies, regardless of age, gender, and years of employment. No association was also found between training sessions regarding infection control and the incidence of NSSIs, consistent with previous research [37]. This lack of association may be due to factors such as irregular participation in training courses, workload demands, fatigue, and workplace pressure. However, a significant association was found between marital status and NSSIs. Numerous studies have supported this [38,39]. This may be attributed to the association of marriage with a lifelong commitment to a healthy lifestyle, which could positively impact nurses' well-being and work experiences. The study had several limitations: high patient volumes, shortage of staff, and extended shifts likely influenced the adherence of nurses to safety measures and their willingness to fully participate fully. The high-pressure environment inherent in the emergency departments may also contribute to the underreporting of NSSIs, potentially biasing the assessment of their true prevalence.

CONCLUSION

The prevalence of NSSIs among nurses in Kirkuk hospitals was found to be relatively high. Marital status emerged as a significant factor associated with the occurrence of these injuries. To address this occupational hazard, it is essential to implement targeted training programs focused on the safe handling of sharp instruments, strict adherence to established safety protocols, and the promotion of timely injury reporting. Additionally, improving occupational safety practices such as eliminating needle recapping. Future research with larger sample sizes is recommended to evaluate the effectiveness of safety interventions across Kirkuk City more comprehensively.

Acknowledgment

The researchers wish to express their sincere appreciation to the hospital's administrating teams for their valuable supporting facilitating this study. Special thanks are extended to the nursing staff who willingly participated, making this research possible.

Authors Contribution

Shaimaa Abass Mohammed designed the project, gathered and put together the data, and wrote the article. Nazar Ahmed Mahmood is in charge of statistics, data analysis and evaluation, and giving the final approval. The study was put together by both writers.

Conflict of Interest

The authors assert the absence of any conflict of interest.

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